NASA Facts

National Aeronautics and
Space Administration

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Materials International Space Station Experiment (MISSE)

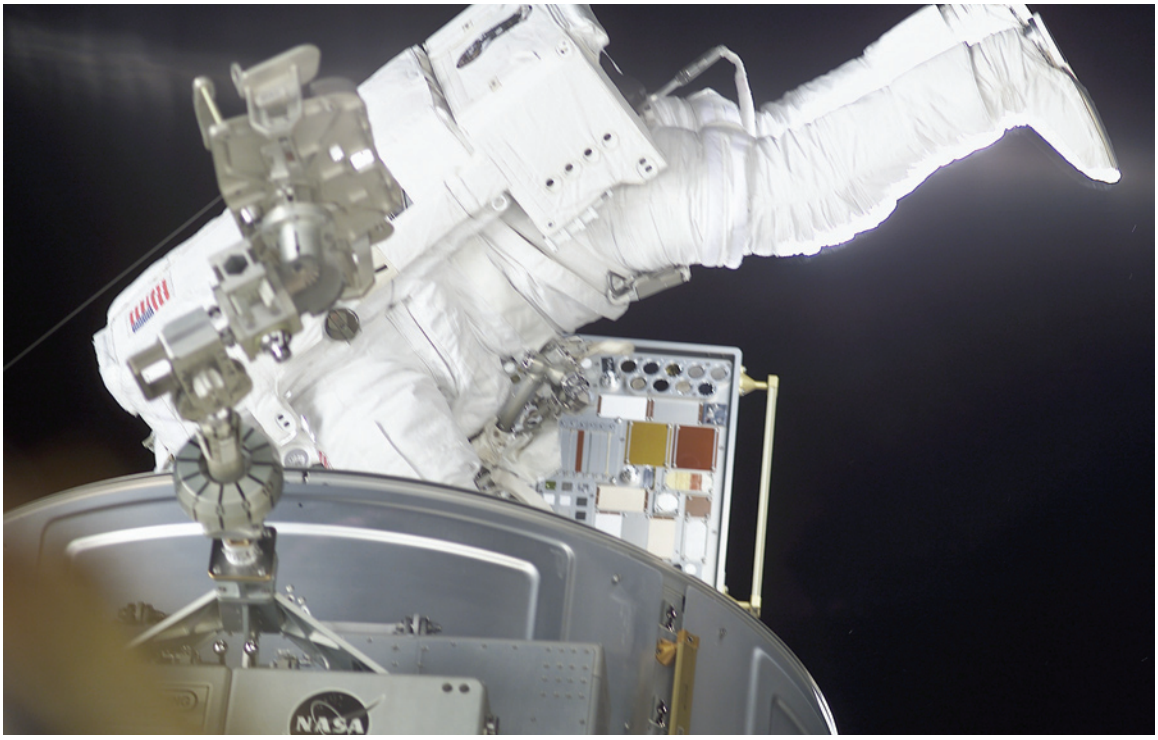
Overview

The Materials on the International Space Station Experiment (MISSE) Project is a NASA/Langley Research Center-managed cooperative endeavor to fly materials and other types of space exposure experiments on the Space Station. The objective is to develop early, low-cost, non-intrusive opportunities to conduct critical space exposure tests of space materials and components planned for use on future spacecraft. NASA fuels discoveries that make the world smarter, healthier and safer.

The Boeing Co., the Air Force Research Laboratory and Lewis Research Center are participants with Langley in the project.

History/Background

Flown to the Space Station in 2001, the MISSE experiments were the first externally mounted experiments conducted on the International Space Station. The experiments are in Passive Experiment Containers (PECs) that were initially developed and used for an experiment on Mir in 1996 during the



During a space walk, astronaut Patrick G. Forrester installs the MISSE experiment, which will expose hundreds of samples to the space environment for about 18 months. When the samples are returned to Earth, they will be analyzed to determine which materials are the most durable and suitable for tomorrow's spacecraft.

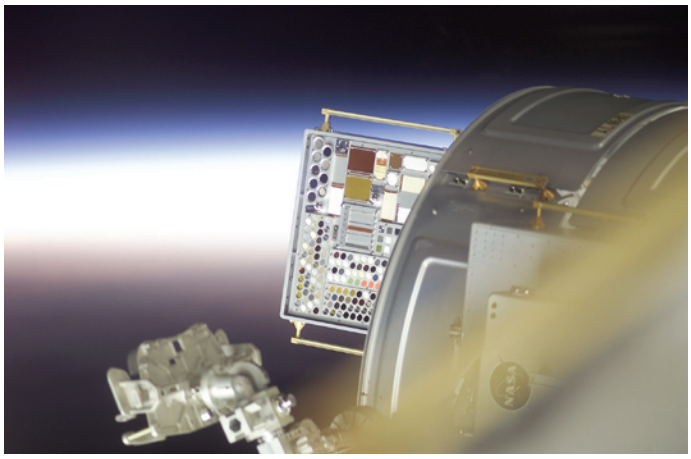
Shuttle-Mir Program. The PECs were transported to Mir on STS-76. After an 18-month exposure in space, they were retrieved on STS-86.

PECs are suitcase-like containers for transporting experiments via the Space Shuttle to and from an orbiting spacecraft. Once on orbit and clamped to the host spacecraft, the PECs are opened and serve as racks to expose experiments to the space environment.

The first two MISSE PECs (MISSE 1 and 2) were transported to the Space Station on STS105 (ISS Assembly Flight 7A.1) in August 2001. About 1,500 samples were tested on MISSE 1 and 2. The samples include ultra-light membranes, composites, ceramics, polymers, coatings and radiation shielding. In addition, components such as switches, solar cells, sensors and mirrors will be evaluated for durability and survivability. Seeds, plant specimens and bacteria, furnished by students at the Wright Patterson Air Force Research Laboratory, are also being flown in specially designed containers.

During STS-114, astronauts will remove the original PECs (1 and 2) from the Station and install MISSE PEC 5. Like the myriad of samples in MISSE PECs 1 and 2, MISSE PEC 5 will study the degradation of solar cell samples in the space environment. PECs 1 and 2 will be returned to NASA Langley Research Center where they will be opened in a clean room and contents distributed to researchers for study.

MISSE PECs 3 and 4 will be launched on STS-121 (July 2005) and placed in the same location that 1 and 2 previously occupied. PECs 3, 4 and 5 will all remain on orbit for one year to continue to study the effects of space exposure on various materials.



Backdropped by a sunrise, the newly installed Materials International Space Station Experiment (MISSE) is visible on the International Space Station.

The MISSE PECs are integrated and flown under the direction of the Department of Defense Space Test Program's Human Space Flight Payloads Office at NASA's Johnson Space Center.

Examples of tests to be performed in MISSE include: new generations of solar cells with longer expected lifetimes to power communications satellites; advanced optical components planned for future Earth observational satellites; new, longer-lasting coatings that better control heat absorption and emissions and thereby the temperature of satellites; new concepts for lightweight shields to protect crews from energetic cosmic rays found in interplanetary space; and the effects of micrometeoroid impacts on materials planned for use in the development of ultra-light membrane structures for solar sails, large inflatable mirrors and lenses.

Benefits

New affordable materials will enable the development of advanced reusable launch systems and advanced spacecraft systems.

For more information, visit **http://www.nasa.gov.**

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